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INSTRUCTION MANUAL

DIGITAL MULTIMETER

TDM–104

TOPWARD

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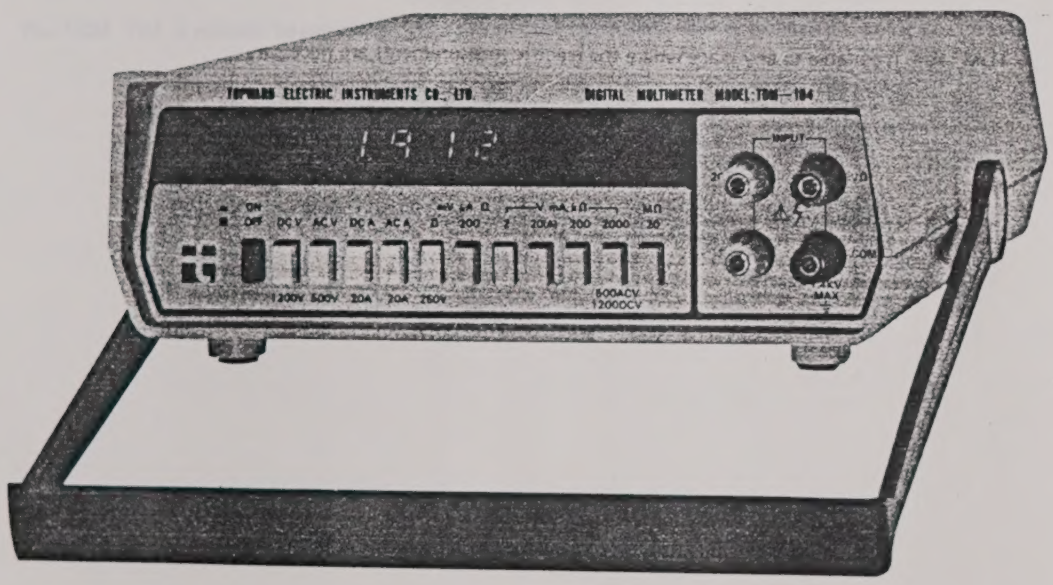
I. Picture of TDM-104



II. General Information

1. Introduction

The TDM 104 Multimeter is 3½ digits, five function digital multimeter. The five function are DC volts, AC volts, DC current, AC current and ohms.

The TDM 104 is suitable to any place where the electric measurements are necessary

DC VOLTAGE

RANGE	MAXIMUM READING	ACCURACY (12 months) 18°–28°C ±(% rdg + digits)	MAXIMUM ALLOWABLE INPUT
200mV	199.9	0.1%+ 1d	1200V momentary
2 V	1.999	0.1% + 1d	1200V momentary
20 V	19.99	0.1% + 1d	1200V
200 V	199.9	0.1% + 1d	1200V
1200 V	1200	0.15% + 1d	1200V

Input Resistance: 10MΩ±0.5% on the 20V, 200V, 1200V range
>1000MΩ on the 200mV, 2V range

Normal Mode Rejection Ratio: Greater than 60dB at 50Hz and 60Hz.
Common Mode Rejection Ratio: Greater than 90dB at 50Hz and 60Hz (1KΩUnbalance).

AC VOLTAGE

RANGE	MAXIMUM READING	ACCURACY ~~(12 months)~~ 18°C–28°C 40Hz–10KHz ~~±(% rdg + digits)~~	10KHz–20KHz
200mV	199.9	0.3% + 1d	0.5% + 2d
2 V	1.999	0.3% + 1d	0.5% + 2d
20 V	19.99	0.3% + 1d	0.5% + 2d
200 V	199.9	0.3% + 1d	0.5% + 2d
500 V	500.0	0.3% + 1d (max. 1KHz)	

Response: Average calibrated in rms of a sinewave.
Maximum allowable input voltage: 500V rms) 750V (peak); 10^7V.Hz maximum.
Input impedance: 1MΩ±1% shunted by less than 100pF
Common mode rejection ratio (1KΩ unbalance): 60dB at DC 50Hz and 60Hz.
Settling time: 2.5 seconds to within 2 digit of final reading.

DC CURRENT

RANGE	MAXIMUM READING	ACCURACY (12 months) 18°C–28°C ±(% rdg + digits)	MAXIMUM VOLTAGE BURDEN	SHUNT RESISTANCE
200μA	199.9	0.2% + 1d	0.3V	1KΩ
2mA	1.999	0.2% + 1d	0.3V	100Ω
20mA	19.99	0.2% + 1d	0.3V	10Ω
200mA	199.9	0.2% + 1d	0.3V	1Ω
2000mA	1999	0.3% + 1d	0.6V	0.1Ω
20 A	19.99	0.5% + 1d	0.6V	0.01Ω

Maximum Input: 2A 250V DC or rms (fuse protected) except for 20A range.
15A continuous. 20A for 1 minute (50% duty cycle)
250V dc or rms (fuse protected) on 20A range.
Settling time: 1 second to within 1 digit of final reading.

AC CURRENT

RANGE	MAXIMUM READING	ACCURACY (12 months) 18℃–28℃ ±(% rdg + digits)				MAXIMUM VOLTAGE BURDEN	SHUNT RESISTANCE
		40Hz–1KHz	1KHz–2KHz	2KHz–10KHz	10KHz–20KHz		
200μA	199.9	0.5% + 2d	0.5% + 2d	0.5% + 1d	0.6% + 2d	0.3V	1KΩ
2mA	1.999	0.5% + 2d	0.5% + 2d	0.5% + 1d	0.6% + 2d	0.3V	100Ω
20mA	19.99	0.5% + 2d	0.5% + 2d	0.5% + 1d	0.6% + 2d	0.3V	10Ω
200mA	199.9	0.6% + 2d	0.7% + 2d	0.5% + 1d	0.6% + 2d	0.3V	1Ω
2000mA	1999	0.6% + 2d	0.7% + 2d			0.6V	0.1Ω
20 A	19.99	0.6% + 2d	1% + 2d			0.6V	

Maximum Input: 2A 250V DC or rms (fuse protected) except for 20A range.
15A continuous. 20A for 1 minute (50% duty cycle)
250V dc or rms (fuse protected) on 20A range.
Settling time: 2.5 seconds to within 2 digit of final reading.

RESISTANCE

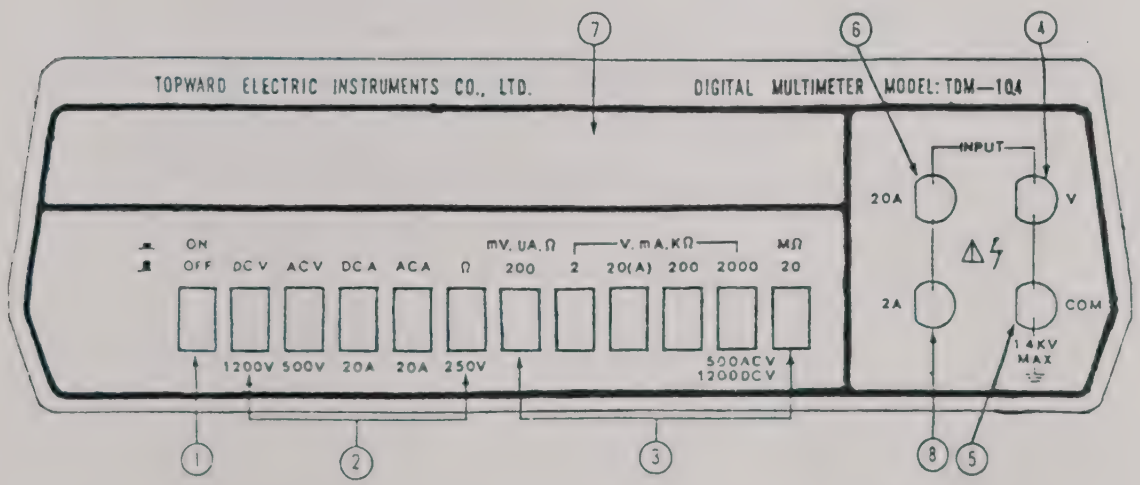
RANGE	MAXIMUM READING	ACCURACY (12 months) 18℃–28℃ ± (% rdg + digits)	MAXIMUM VOLTAGE ACROSS UNKNOW ON RANGE	NORMAL APPLIED CURRENT
200Ω	199.9	0.2% + 1d	0.2V	1mA
2KΩ	1.999	0.2% + 1d	2V	1mA
20KΩ	19.99	0.2% + 1d	2V	100μA
200KΩ	199.9	0.2% + 1d	2V	10μA
2000KΩ	1999	0.3% + 1d	2V	1μA
20MΩ	19.99	0.5% + 1d	2V	100nA

Maximum allowable input: 250V DC or rms on all ranges. (*Momentary)
Maximum open circuit voltage: 10V
Settling time: 1 second to within 1 digit of final reading except 2 seconds on the 20MΩ range.
* momentary: 8 sec/min.

GENERAL

CONVERTION PERIOD. 400mS.
ENVIRONMENT: Operating: 0℃ to 50℃, 0% to 80% relative humidity up to 40%℃.
Storage: –25℃ to 65℃.
MAXIMUM COMMON MODE VOLTAGE: 1400V peak!
DIMENSION. 233W x 80H x 300D
WEIGHT: 1.4Kg
POWER: 105–125/210–250V Switch Selectable 50/60Hz 6VA.
ACCESSORY: ACS-005 Banana – Probe.

3. Front Panel Features:



4. Front Panel Illustration

(1) Power ON/OFF Switch – Pushbutton push on/push off switch.

(2) Function Switch – Function markings are located above each pushbutton switch.

⎓ V = DC Volts
∿ V = AC Volts
⎓ A = DC Amps
∿ A = AC Amps
Ω = Ohms

(3) Range Switch – Range markings are located above each pushbutton switch. Block bands identify the range switch assiciated with each function switch.

(4) DCV/ACV/OHMS – DC Volts, AC volts and Resistors input terminal.

(5) Input common terminal.

(6) 20A – DC and AC high current input terminal.

(7) Display – Indicates the measured value and polarity of DC volts or amps.

(8) DCA/ACA – DC and AC current input terminal.

5. Operating Instruction

(1) Connecting the instrument to AC power ource. For specified measurement accuracy, allow the instrument to warm up at least 5 minutes.

(2) DCV measurement – Push the DCV switch and suitable range switch. The display may indicate the measured value and polarity.

(3) ACV measurement – Push the ACV switch and suitable range switch. The display may indicate the measured value.

(4) DCA measurement – Push the DCA and highest range switch, apply the unknown DC current to the "A" terminal and repush the range switch from the highest range to the suitable range step by step.

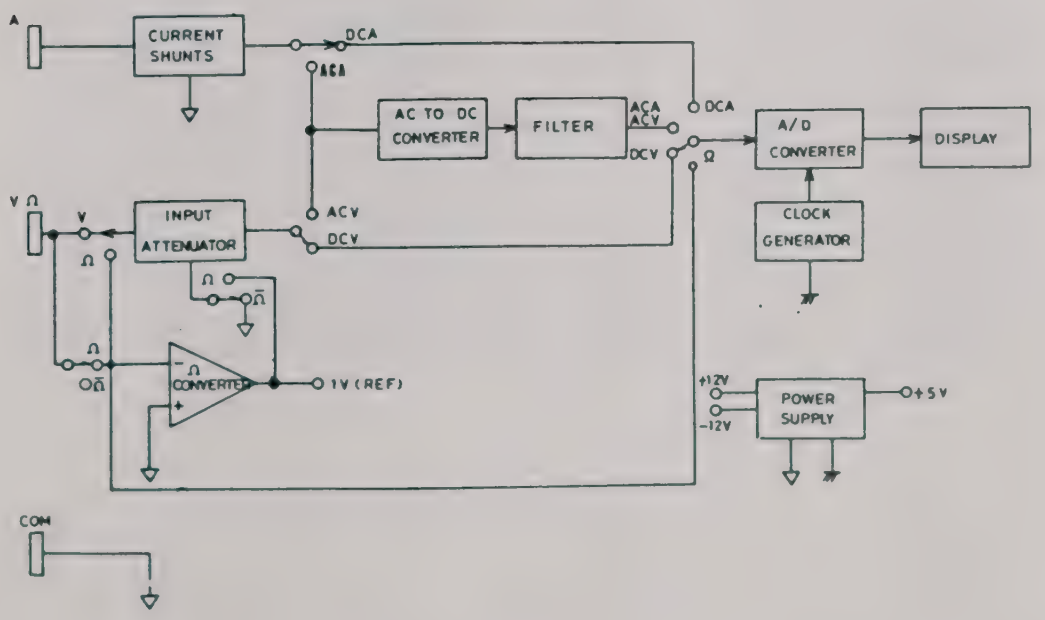
(5) ACA measurement – Push the ACA switch and repeat the procedure as the same as (4).

(6) OHMS measurement – Push the "Ω" switch and suitable range switch, apply the unknown resistor to "V/Ω" terminal. The display may indicate the resistance.

6. Safety considerations (CAUTION!)

(1) Before connecting the instrument to AC power, verify that the AC power source matches the power requirement of the instrument.
(2) For specified measurement accuray, allow the instrument to warm-up for at least 5 minutes.
(3) The correct operations of the function switch and range switch are required before the measuring procedure.
(4) Under voltage measuring condition, the input DC voltage do not exceed 1200V,(DC+peak AC) the input AC voltage do not exceed 500V (750V DC; 500V AC rms)
(5) Do not exceed a maximun input current of 2A. If use the A input current terminal.
(6) Do not exceed a maximun input current of 20A. If use the 20A high input current terminal.
(7) Do not supply voltage greater than 150V rms between the ohms and common input terminal.
(8) Between COM. terminal and ground must be less than ±1.4KV (DC+peak AC).

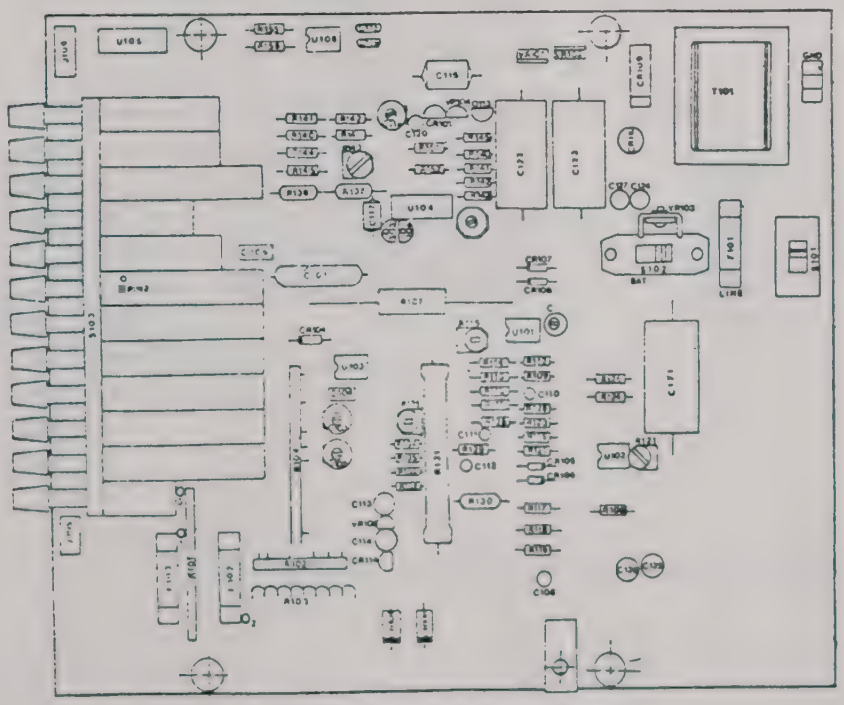
7. Block Diagram:



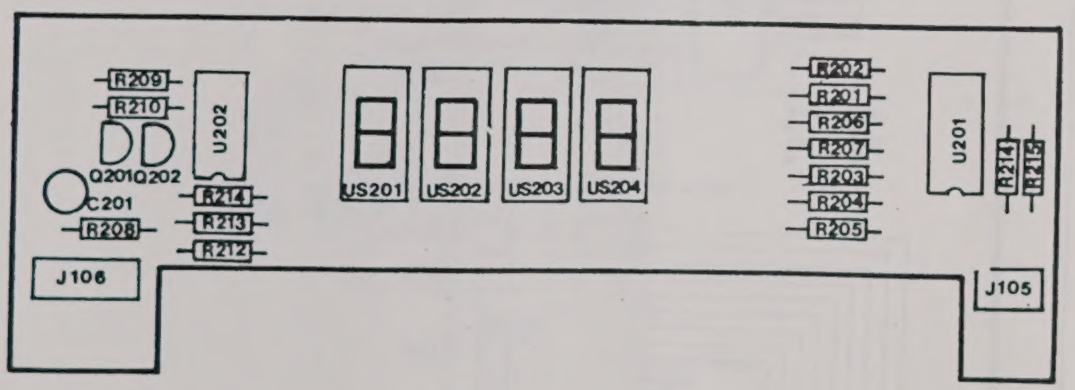
III. Maintenance

8. Calibration Procedure:

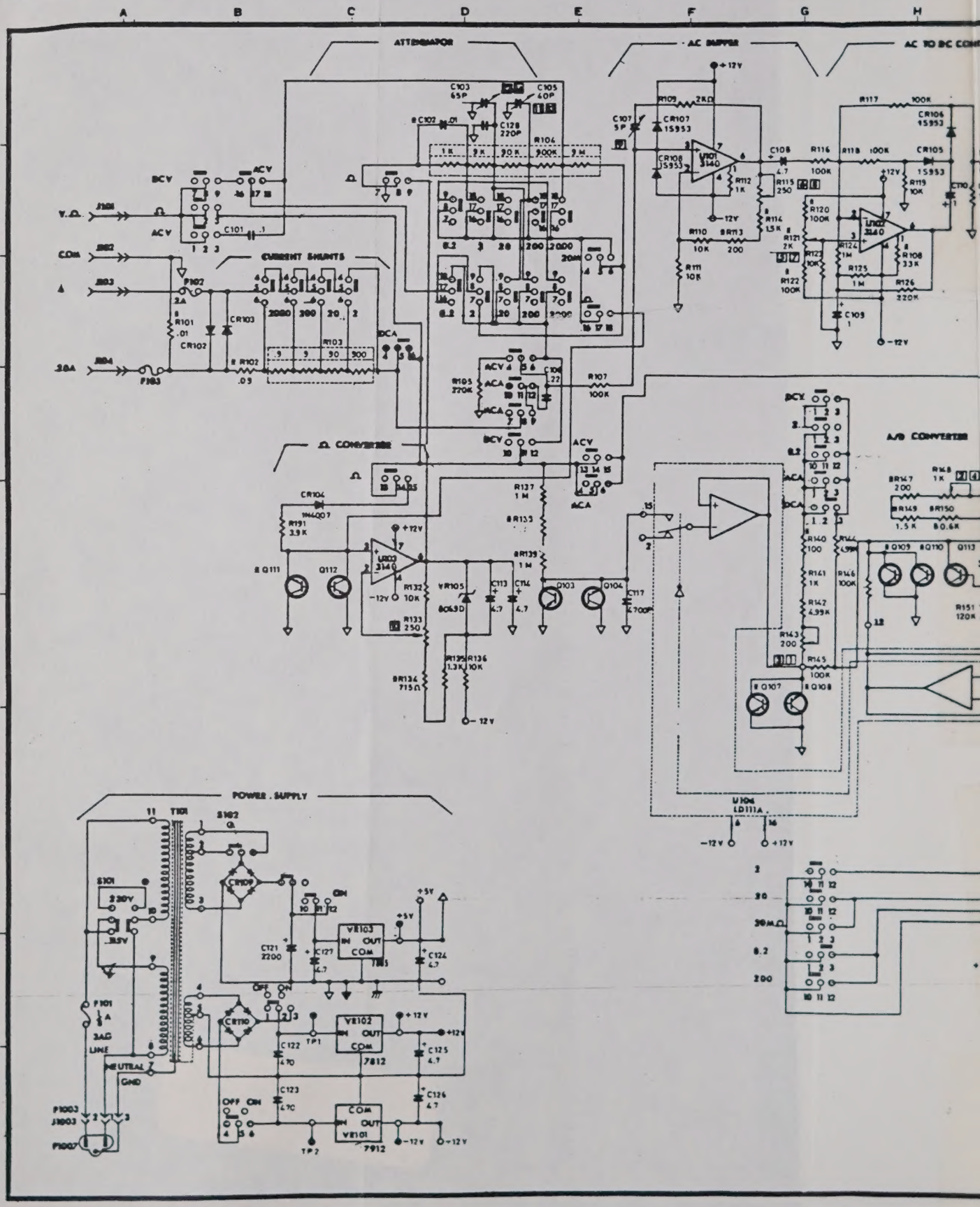
Step	Function	Range	Input	Adjustment Point	Desired Reading	Test Equipment
1	DCV	200mV	Short	C116	00.0 digit	None
2	DCV	2V	1.9000V	R148	1.900	DC Calibrator
3	DCV	200mV	190.00V	R143	190.0	DC Calibrator
4	DCV	2V	1.9000	R148	1.900	DC Calibrator
5	ACV	200mV	Short	R121	00.0	None
6	ACV	2V	1.9000V at 400Hz	R115	1.900	AC Calibrator
7	ACV	200mV	Short	R121	00.0	AC Calibrator
8	ACV	2V	1.9000V at 400Hz	R115	1.900	AC Calibrator
9	ACV	2V	1.9000V at 20KHz	C107	1.900	AC Calibrator
10	Ω	2KΩ	1.9000KΩ	R133	1.900	Decade Resistor
11	ACV	20V	19.000V at 14KHz	C105	19.00	AC Calibrator
12	ACV	200V	190.00V at 20KHz	C103	190.0	AC Calibrator
13	ACV	20V	19.000V at 14KHz	C105	19.00	AC Calibrator
14	ACV	200V	190.00V at 20KHz	C103	190.0	AC Calibrator



COMPONENT LAYOUT: PC-221: MOTHER BOARD.



COMPONENT LAYOUT PC-222, DISPLAY BOARD.


ATTENUATOR
AC SUPPLY
AC TO DC CONV
CURRENT SHUNTS
Ω CONVERTER
A/D CONVERTER
POWER SUPPLY
ACV
DCV
ACA
DCA
V.Ω
COM
A
10A
+12V
-12V
+5V
-5V
LINE
NEUTRAL
GND
7805
7812
7912
LD111A

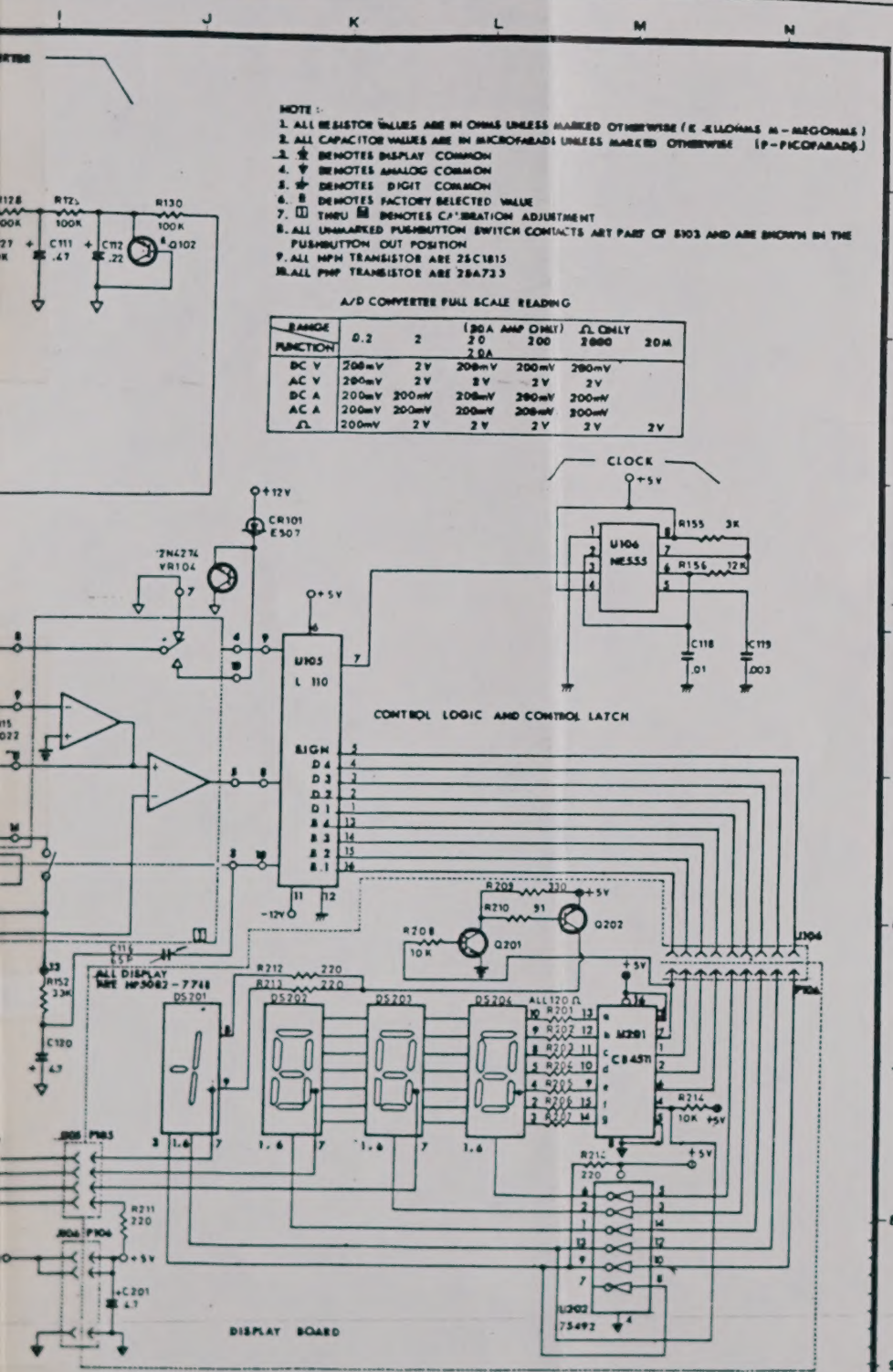


FIGURE 4-1. SCHEMATIC DIAGRAM, MODEL : 104 MULTIMETER